

**FORWARD-LOOKING STATEMENTS**

Portions of the narrative set forth in this document that are not statements of historical or current facts are forward-looking statements. The Company's actual future performance may materially differ from that contemplated by the forward-looking statements as a result of a variety of factors. These factors include, in addition to those mentioned elsewhere herein:

- The condition of the markets which the Company serves, whether defined geographically or by segment, with the major market segments being telecommunications and computer, optical media, automotive electronics, industrial components, aerospace and defense, and appliance;
- Changes in product mix and the financial condition of particular customers;
- The Company's success in implementing its strategic plans and the timely and successful completion of pending capital expansion projects;
- The availability of adequate lines of credit and the associated interest rates;
- Other financial factors, including tax rates, exchange rates, energy costs and the cost and availability of insurance;
- Changes in government regulatory requirements and the enactment of new legislation that impacts the Company's obligations; and,
- The conclusion of pending litigation matters in accordance with the Company's expectation that there will be no material adverse effects.

# *Brush Engineered Materials Inc.*

## *Profile*

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- *Publicly traded since 1956: NYSE-listed since 1972.*
- *Founded 1931 as Brush Beryllium Company.*
  - Building off earlier pioneering technical work at Brush Laboratories
  - Initial scope was development of commercial markets
- With onset of WW II and post war period, significant growth in defense and eventually, aerospace applications
- Mid-70s: major expansion of new commercial markets.
- Today, commercial markets represent 90% + of revenues



# *Brush Engineered Materials Inc.*

## *Profile*

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- Leading manufacturer of high performance engineered materials
- Operations, service centers and major office locations in North America, Europe and Asia
- Serving growth oriented, long term, global markets:
  - Telecommunications and computers
  - Automotive electronics
  - Optical media



*Brush Engineered Materials Inc.*  
*“Advancing The World’s Technologies”*

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- BEM Materials are found in a wide range of critical and demanding applications requiring:
  - Strength
  - Reliability
  - Thermal & electrical conductivity
  - Miniaturization
  - Weight reduction
  - Power distribution
  - Reflectivity



# *Brush Engineered Materials Inc.*

## *End Uses*

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Cellular phones and other wireless communications



Notebook and network computers



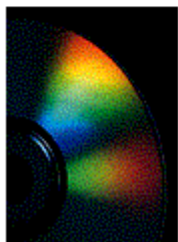
Electronic components in cars and trucks



Life enhancing devices



Optical Media



Industrial products



*Brush Engineered Materials Inc.*  
*Organized into Two Separate Reportable Segments*

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**Metal Systems**

Brush Wellman Inc. (Alloy Products and Beryllium Products)

Technical Materials, Inc.

**Microelectronics**

Williams Advanced Materials Inc.

Electronic Products



*Brush Engineered Materials Inc.*  
*Unique Capabilities from Mine to Value Added Material*

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**Metal Systems**

- World's only fully integrated producer of beryllium, beryllium-containing alloys and beryllia ceramic.

High beryllium metals, ceramics and beryllium alloys

Delta, UT

Bertrandite Ore  
Mining & Extraction



Elmore, OH

Casting, Rolling &  
Finishing



Reading, PA

Thin Gauge Rolling  
& Finishing



# *Unique Capabilities from Mine to Material*

## *Diverse in Scope and Product*

### **Metal Systems**

#### **Alloy Products**

- Manufactures strip products which are primarily copper beryllium and nickel beryllium alloys and bulk products which are copper, nickel and aluminum-based alloys manufactured in rod, bar, tube, plate and other customized forms.

#### **Beryllium Products**

- Manufactures pure beryllium and beryllium aluminum alloys

#### **Technical Materials, Inc. (TMI)**

- Manufactures engineered material systems including clad metals, plated metal, electron beam welded, solder plated and reflow materials.

### **Microelectronics**

#### **Williams Advanced Materials (WAM)**

- Produces precious metal and specialty alloy products

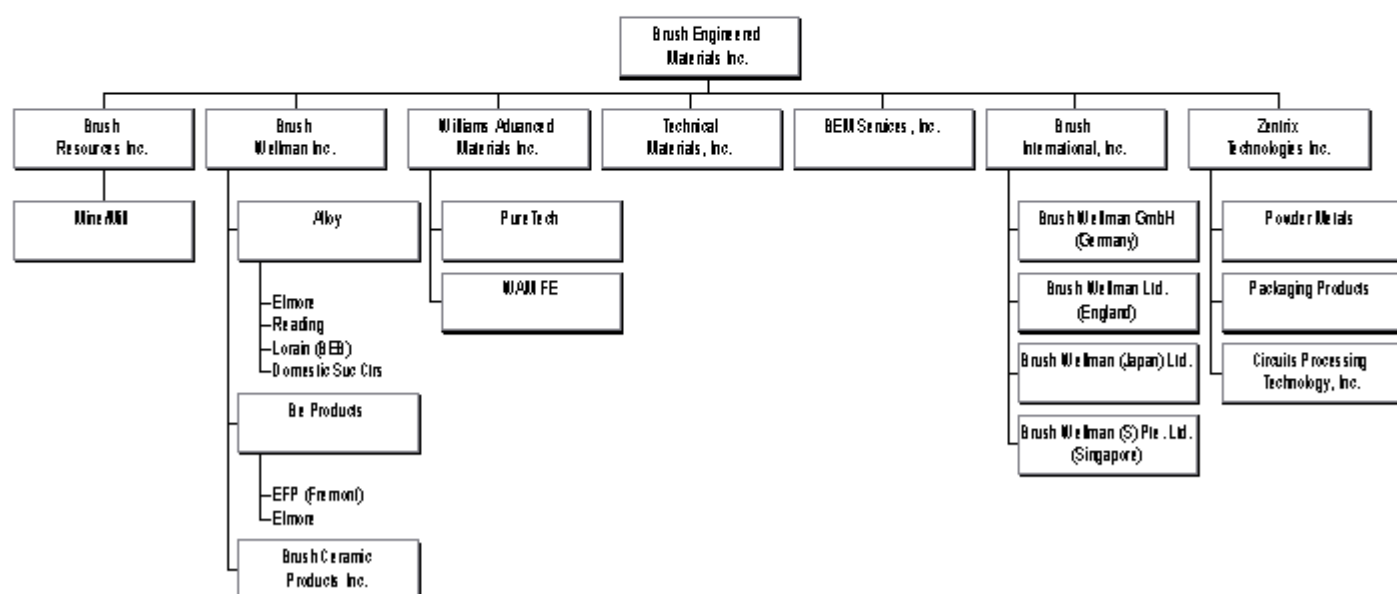
#### **Electronic Products**

- Electronic packaging, circuitry and powdered metal products

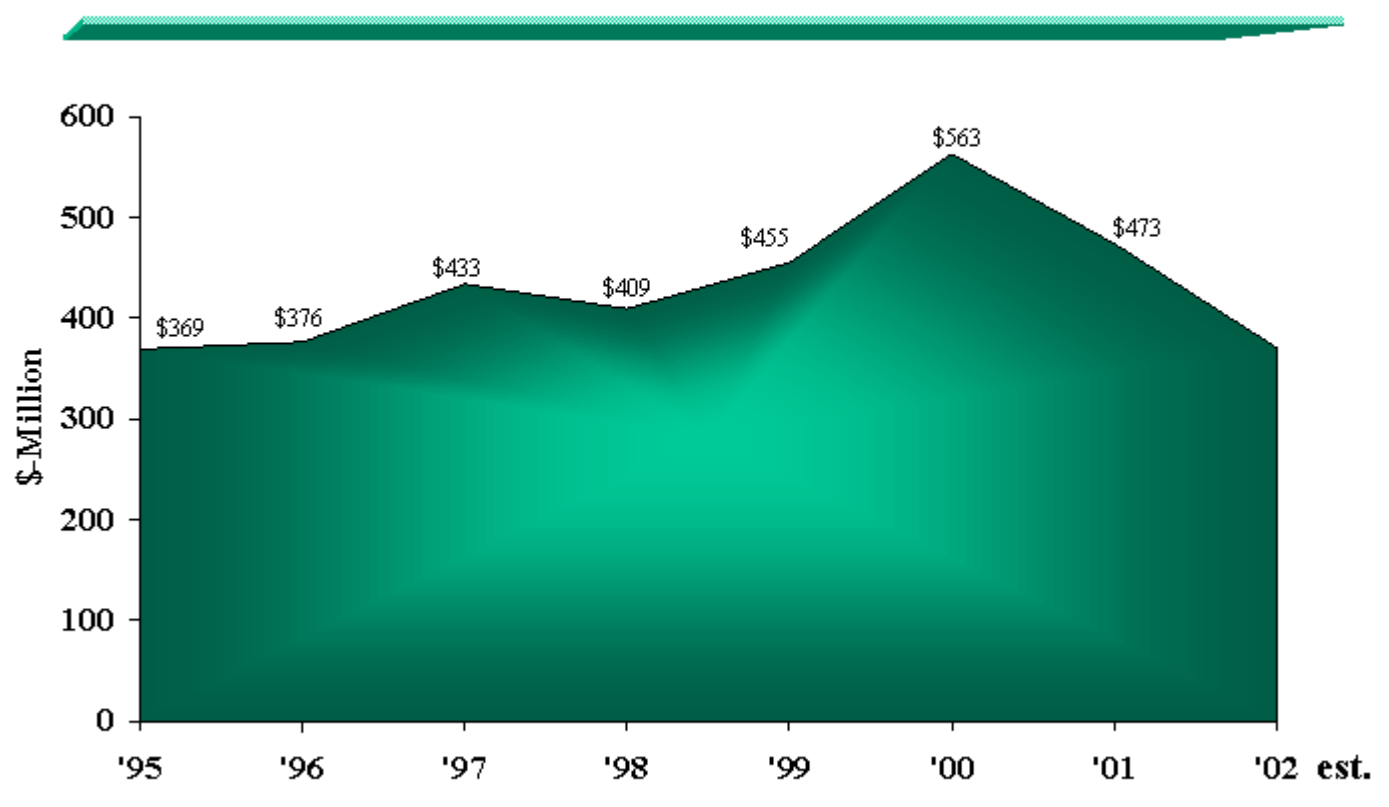


# Corporate Structure

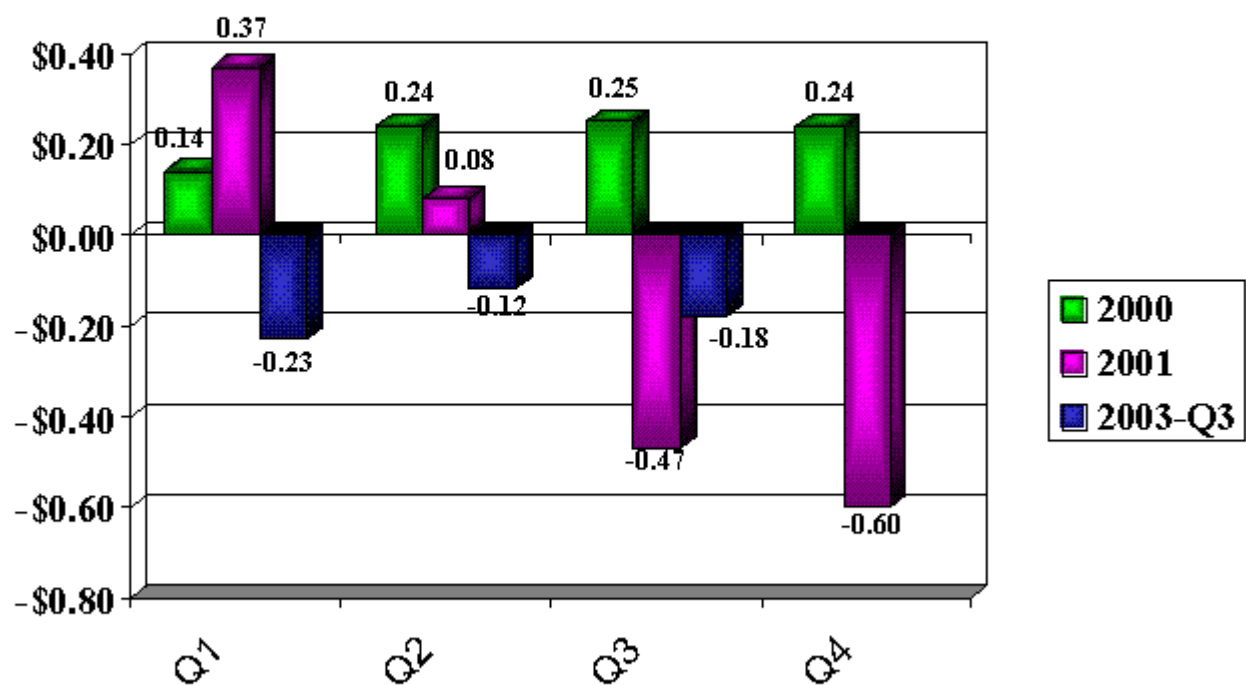
May 16, 2000 Brush Engineered Materials Inc. became the publicly-traded Parent Company of Brush Wellman Inc. On January 1, 2001 Phase II of the Company's reorganization was completed with the creation of three new entities: Brush Ceramic Products Inc., Brush Resources Inc. and Zentrix Technologies Inc.



*Sales Have Declined to mid-90's Levels*



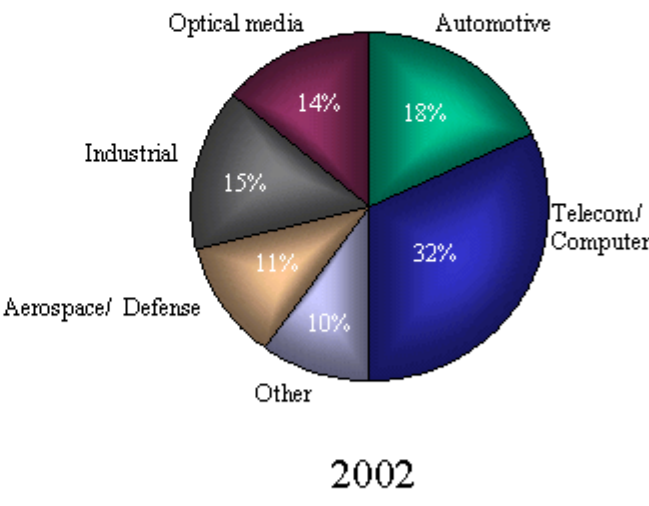
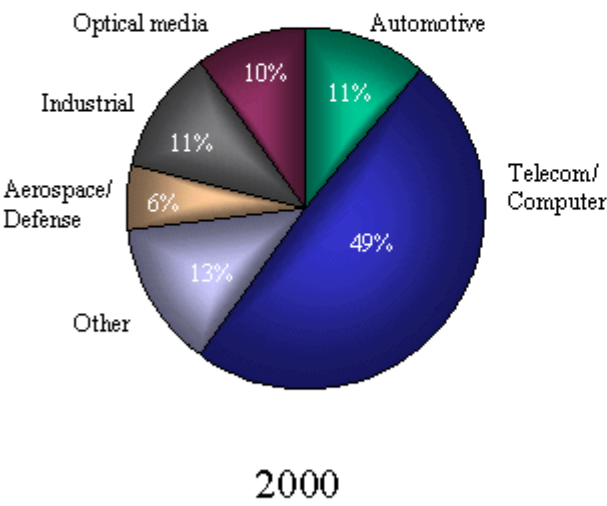
# Quarterly Earnings Comparison



Q2 2001 telecommunication/computer market decline



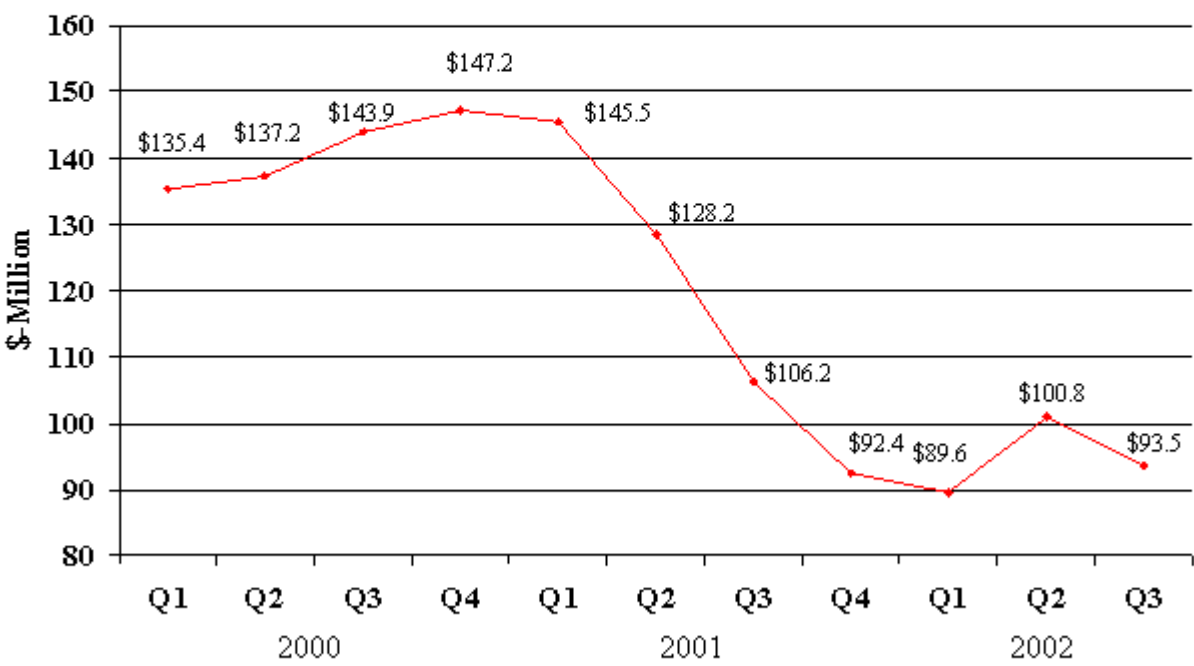
*The portion of Brush's revenue from the telecom/ computer market has declined from nearly 50% to slightly more than 30%*



# US Electronic Equipment Orders



*Brush experienced a major downturn in Q-2 and Q3 2001, with revenue remaining flat since*



*As a result, significant losses have occurred  
over the past five quarters*

In \$-Million, except for per share data

	<u>2001</u>				<u>2002</u>		
	<u>Q-1</u>	<u>Q-2</u>	<u>Q-3</u>	<u>Q-4</u>	<u>Q-1</u>	<u>Q-2</u>	<u>Q-3</u>
Net Sales	\$145.5	\$128.5	\$106.2	\$92.4	\$89.6	\$100.7	\$93.5
Net Income	6.2	1.3	(7.8)	(9.9)	(3.8)	(2.0)	(2.9)
Per Share/ Diluted	0.37	0.08	(0.47)	(0.60)	(0.23)	(0.12)	(0.18)

*Through this period, variable margins have improved, despite the fall in revenue*

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<u>Year/Quarter</u>	<u>Variable Margin%</u>
2000	39.7%
2001	40.2%
2002 – YTD	40.4%

## *Brush has managed to reduce its breakeven point by \$100 million*

		Est.	Change
(\$-Million)	<u>2001</u>	<u>2002</u>	<u>01 --&gt; 02</u>
Fixed Costs			
• Mfg Overhead	\$ 121	\$ 104	\$ (17)
• SG&A + interest	<u>87</u>	<u>70</u>	<u>(17)</u>
Total	208	174	(34)
Contribution Rate	40%	41%	
Breakeven Sales	\$ 520	\$ 420	\$ (100)

Note: Based on 2002 mix and metal prices

## *Headcount has been reduced by 24%*

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Employment as of:	<u>12/31/00</u>	<u>12/31/01</u>	<u>9/30/02</u>	<u>% Change</u>
Alloy	1,221	832	802	34%
All Others	<u>1,279</u>	<u>1,114</u>	<u>1,096</u>	<u>14%</u>
Total	2,500	1,946	1,898	24%

# *Cash flow has remained positive through reduced working capital and lower capital spending*

<u>Operating Cash Flow</u>						
	\$-Million					
	<u>OP</u>	<u>Depr</u>	<u>Capex</u>	<u>Change in A/R</u>	<u>Change in Inventory</u>	<u>Operating Cash Flow</u>
2000	\$23	\$23	\$(21)	\$(13)	\$(8)	\$4
2001	(14)	21	(23)	38	7	29
Sept 2002 YTD	(12)	16	(4)	(5)	15	10

<u>Consolidated Cash Flow</u>					
	\$-Million				
	<u>Operating Cash Flow</u>	<u>Other</u>	<u>Changes</u>	<u>Change in Debt</u>	<u>Change in Cash</u>
2000	\$4		\$6	\$(6)	\$4
2001	29		(32)	6	3
Sept 2002 YTD	10		(3)	(11)	(4)

## *Alloy has made significant progress*

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- Working Capital
  - Reduced 36% (\$56M) since Q-1 2001
- Expense Control
  - Manpower reduced by 34% since Q-1 2001
  - Manufacturing overhead and SG&A 24% lower in Q-3 2002 vs. Q-1 2001
- Operations
  - Safety (OSHA recordable) rate improved by 32% in manufacturing
  - Rework rate improved 39% YTD
  - On-time shipments to Service Centers 13% higher YTD, along with 11% improvement in manufacturing cycle times

## *TMI has responded aggressively to the market downturn*

### Technical Materials, Inc.

	<u>Q-1 2001</u>	<u>Q-3 2002</u>	<u>% Change</u>
Revenues in \$M	\$21.0	\$11.0	(52%)

- Significant reduction in cost, above breakeven
  - Variable cost – down by \$4.3M over 18 months
    - Workforce reduced by 35%
    - Innovative partnership with State Workplace Program
    - Major reduction in supply and maintenance cost
  - Fixed cost – down by \$4.4M over 18 months
  - Operational improvements
    - 15% increase in productivity
    - 3% yield improvement

## *Electronic Products also affected adversely*

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	<u>Q-1 2001</u>	<u>Q-3 2002</u>	<u>% Change</u>
Revenues in \$M	\$11.5	\$7.0	(39%)

Electronic Products has also responded

- Cost reduced, but not above breakeven
- Lean/Six Sigma programs focused on operational improvements

## *WAM is also generating favorable results*

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- Sales and value-added flat
- Good growth in PVD, especially optical markets
- Strong earnings and cash flow
  - Reduced headcount by 10%
  - Reduced inventories, including consigned metals, by more than \$6M in past year

## *Beryllium Products is performing strongly*

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- Revenue improved 16% on strength of
  - Military/defense
  - Aerospace
- Solidly profitable
  - Projected operating profit to improve more than \$6 million from 2000 to 2002
- Margins improved substantially
  - Working capital as % of sales improved 20+% 2000-02

## *Corporate costs have also been reduced*

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- Dividend suspension
- Benefit changes/401-K
- Wages frozen
- Service cost reductions
- Legal expenses down

## *Near-term outlook for the telecom/computer market remains highly uncertain*

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“The mobile infrastructure market remains challenging with continued low investments.” . . . .Nokia

“The market will keep shrinking in the second half. The question is what it will do next year. Today, I can’t say when (a recovery will happen). We are still looking at an excess of capacity.” . . . .Alcatel CEO

“A number of telecom equipment suppliers have recently reported lower than expected sales and orders for the third quarter. This is consistent with our view that the market remains uncertain with few signs of stabilizing in the near term.” . . . .Ericsson statement

“Customers are increasingly having a harder time projecting their near-term business prospects in the weak spending environment.” . . . .Cisco CEO

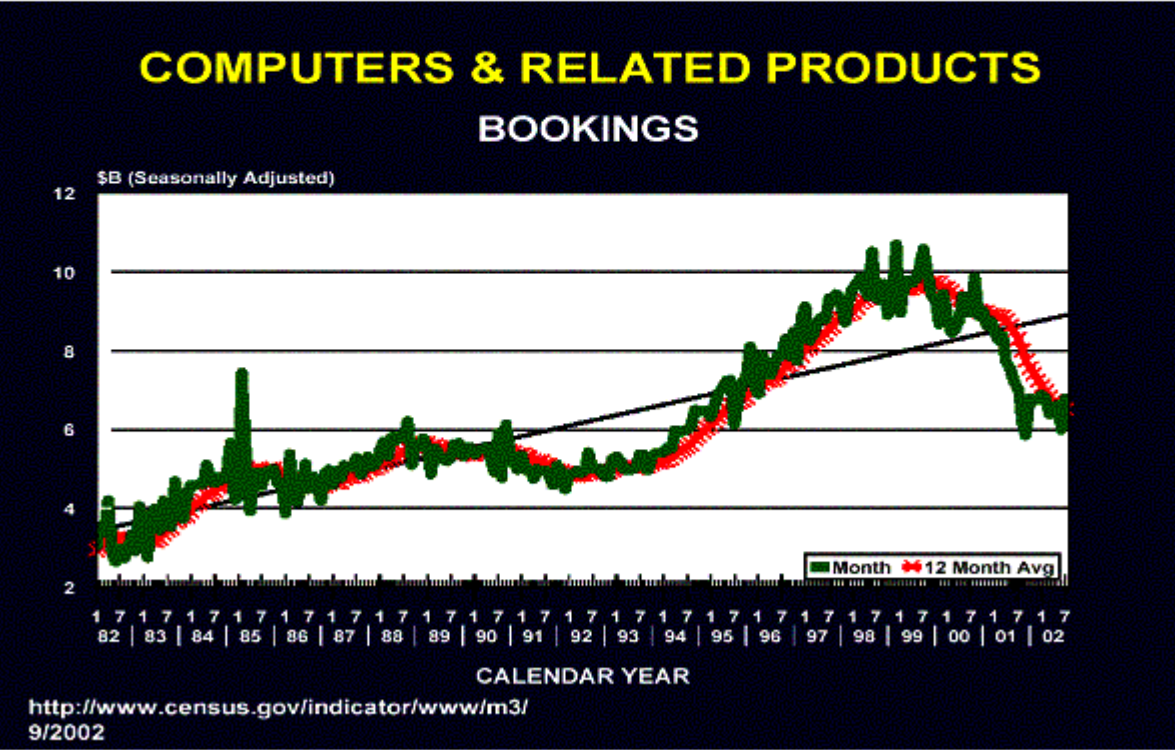
“(There is) continuing market softness, and ongoing uncertainty in customer spending levels, particularly in North America.” .... Lucent Technologies

## *Longer term outlook for our engineered materials is attractive*

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- Higher performance requirements growing
  - Electrical
  - Thermal
  - Mechanical
    - Fatigue resistance
    - Corrosion resistance
    - Strength
    - Anti-galling

# Computers and Related Products



## *For example, Alloy is aggressively working to broaden its base*

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### New Products

Strip New Product Forms

New Strip Alloys

MoldMax® XL

ToughMet™

Undersea Housings

### Applications/Markets

Tubing, Bearings and other  
special applications

- Oil and Gas
- Instrumentation

Electronics Market

Plastics Tooling

Bearings and Wear applications

Marine and Power systems

## *Keys to returning to profitability in 2003 and beyond:*

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- Improving margins through operational efficiency
  - Lean manufacturing
  - Six Sigma
- Further overhead reductions
- Broaden the base – new revenue
- Improvement in demand from the telecom/  
computer market

## *Summary*

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- Working aggressively to get to break even ASAP
- Cash flow is expected to remain positive through continued working capital reductions and minimal capital spending
- Downturn of key end-use markets is unprecedented
  - Brush is not content to “wait it out”
- Long-term prospects bright
  - Brush Engineered Materials is well positioned to capitalize on this growth

# Segment Sales Review

		<u>2000</u>		<u>2001</u>		<u>2002 (thru Q3)</u>	
		\$		% sales		% sales	

# Segment Sales Review

	Q1 2002		Q2 2002		Q3 2002	
	\$	% sales	\$	% sales	\$	% sales
➤ Metal Systems Group	56	62%	64	63%	57	61%
– Alloy	38	42%	41	41%	38	40%
– Beryllium Products	6	7%	10	10%	8	9%
– TMI	12	13%	13	12%	11	12%
➤ Microelectronics Group	34	38%	34	34%	34	37%
– WAM	26	29%	27	27%	27	29%
– Electronic Products	8	9%	7	7%	7	8%
– Other	0	0%	3	3%	2	2%
TOTAL	90	100%	101	100%	93	100%



# Segment Earnings

	<u>Q3</u>	<u>2000</u>		<u>2001</u>		<u>2002 thru</u>	
		\$	% total	\$	% total	\$	% total
Metal Systems Group		10.2	44%	(20.1)	100%	(23.6)	100%
Microelectronics Group		8.4	37%	4.5	-	5.0	-
Other		<u>4.4</u>	19%	<u>1.5</u>	-	<u>6.6</u>	-
Total Segment EBIT		23.0		(14.1)		(12.0)	



## *Segment Earnings - 2002*

	<u>Q1</u>	<u>Q2</u>	<u>Q3</u>
Metal Systems Group	(8.5)	(5.1)	(10.0)
Microelectronics Group	2.2	1.5	1.3
Other	<u>.8</u>	<u>1.0</u>	<u>4.8</u>
Total Segment EBIT	(5.5)	(2.6)	(3.9)



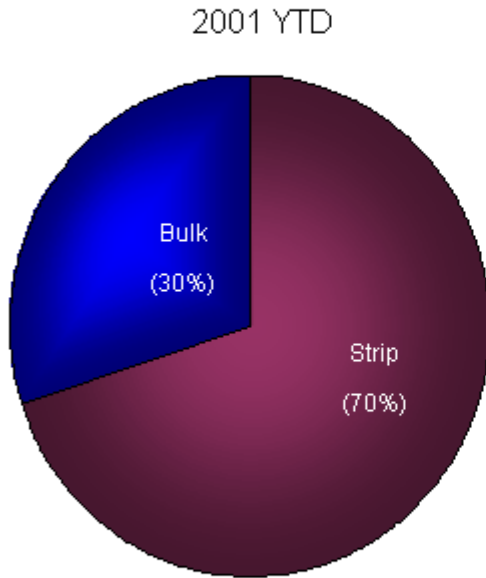
# *Brush Wellman Alloy Vision*

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Brush Wellman is the leading supplier of High Performance Copper Alloys worldwide, providing manufacturing excellence in the form of high reliability products and services to satisfy our customers most demanding applications. We provide these services in a culture of local support and global teamwork.

**BRUSHWELLMAN**  
Engineered Materials

# *Alloy Products Markets*



- Strip Markets
  - Telecommunications
  - Computers
  - Automotive Electronics
  - Appliance
- Bulk Markets
  - Plastic molds
  - Undersea
  - Aerospace
  - Oil and gas
  - Mining
  - Bearings

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# *Alloy Products*

## *Strip product forms & applications*

### ➤ **Product Forms**

- Typically thinner gauge than 0.025" (0.6 mm)
- Typically supplied in coils of 1/2" - 2" wide
- Typically delivered in quantities of 20 - 12,000 lb/order
- Always manufactured to customer specified and frequently customized combinations of properties.
- Supplied either as ready to stamp and use, or for customer to heat treat after stamping to obtain specific properties.

### ➤ **Strip Products**

- |   |  |
|---|--|
| - Stamped and formed conducting spring components | - Electronic connector terminals         |
|   | - Automotive wiring harness terminals    |
|   | - Electrical relay and switch contacts   |
| - Stamped and formed mechanical components        | - Thermostat and pressure sensor bellows |
|   | - Shielding Strips                       |
|   | - Microprocessor Sockets                 |

### ➤ **Rod & Wire**

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| - Swiss machine turned components | - Microprocessor PGA sockets        |
| - Cold headed components          | - High frequency coaxial connectors |

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# *Alloy Products*

## *Strip Products - Strategy*

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- **Maintain focus on 4 major end-use markets**
  - Computer      Telecommunications      Automotive      Appliance
- **Defend market leadership in traditional alloy strip, rod & wire**
  - Reduce total cost of manufacture to allow penetration of mid-range alloy applications
  - Enhance product properties to provide additional value to customers
- **Introduce new alloys to meet needs of targeted market opportunities.**
  - Brush 60, CuTi, ToughMet, Alloy 390
- **Focus on new non-connector markets**
  - Deep Offshore Oil and Gas, Bearings, Instrumentation Tubing, Heat Exchanger Tubing
- **Geographic Growth**
  - Expand commercial operations in Asia Pacific

# *Strip Capacity Expansion*

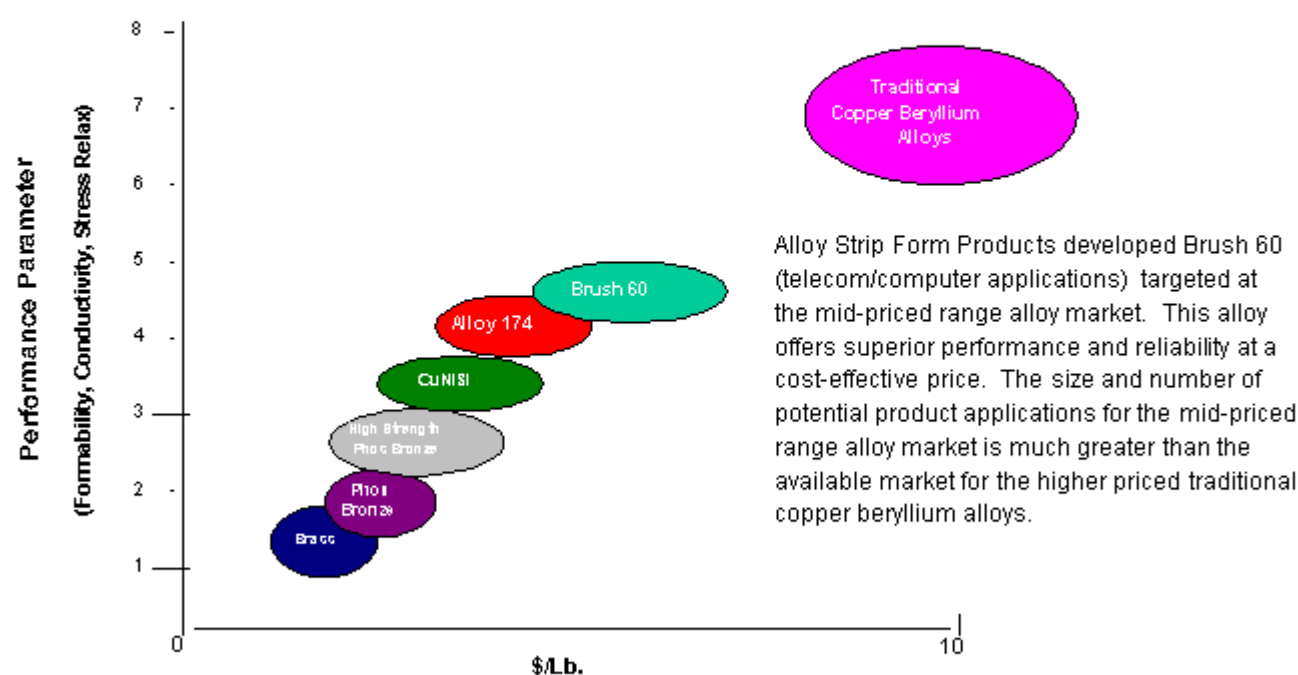
## *Elmore and Reading Facilities*

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- \$140 Million
- Added casting, hot rolling, annealing and cold rolling capacity at Elmore
- Added light gauge strip and mill hardening capacity at Reading
- 50% to 100% capacity increase depending upon product

# Competitive Alloy Comparison & Strategy



# *Automotive Electronics*

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Definition: power and signal distribution in passenger cars and light trucks - connectors, switches and relays

# *Automotive Applications*

## Potential New Applications:

- Infotronics/telematics - in car multimedia systems and mobile communication systems, navigational, global positioning, internet based services.
- Powertrain electronics - in vehicle networks, drive-by-wire systems, continuously variable transmission, intelligent braking
- Safety systems - intelligent air bag systems, driver alertness monitoring, adaptive cruise control, frontal collision warning, intelligent highway vehicle systems, automatic emergency notification
- 42 Volt Powernet - increase number of terminals, switches and relays used in a vehicle; shift mix of components size toward miniaturization due to smaller current and increase the number of performance critical systems in a vehicle.

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# *Computer*

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Definition: Brush Wellman's high performance alloys are sold to the computer industry in strip and wire forms for connectors, contacts, and shielding. End use applications include servers, workstations, notebook and desk top computers, personal digital assistants (PDAs), and data storage devices.

# *Computer Applications*

## Examples of specific end-use product applications

- Fingerstock shielding used in servers and data storage.
- Power connectors used in server power supplies manufactured by Sun, HP, Compaq, and Intel.
- Intel and AMD's Pentium 4 microprocessor socket connectors.
- PDA ID connector and battery contacts.
- VHDM connector system for EMC data storage systems.

## Examples of future target product applications

- Intel and AMD's Pentium 5 microprocessor connectors.
- Power connectors for multi-chip module interfaces as well as backpanel power applications in high end servers.
- High pin count and high density flex circuit interface connectors for high resolution flat panel displays.

**BRUSHWELLMAN**  
Engineered Materials

# *Telecommunications*

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Definition: Brush Wellman's high performance alloys are sold to the telecommunications industry in strip and wire forms for connectors, contacts, shielding, switches and relays. End use applications include wireless base stations, cell phones, pagers, telecom switching equipment, transmission equipment and communication networks.

# *Telecommunication Applications*

## Examples of specific end-use product applications

- Handheld and portable device battery clips, antenna clips, I.O. connectors, board to board connectors, SIM card connectors & display connectors.
- Category 6 modular jacks for connecting data networks.
- Shielding gaskets and clips for EMI protection.
- Coaxial switches for cable company central office switches.
- VHDM connector system used in backpanel connector systems for fast Ethernet and Gigabit Ethernet switches and routers.

## Examples of future target product applications

- Category 7 modular jacks for data networks.
- Low profile board to board connectors for wireless handsets and high speed mezzanine connectors for network switches and routers.

**BRUSHWELLMAN**  
Engineered Materials

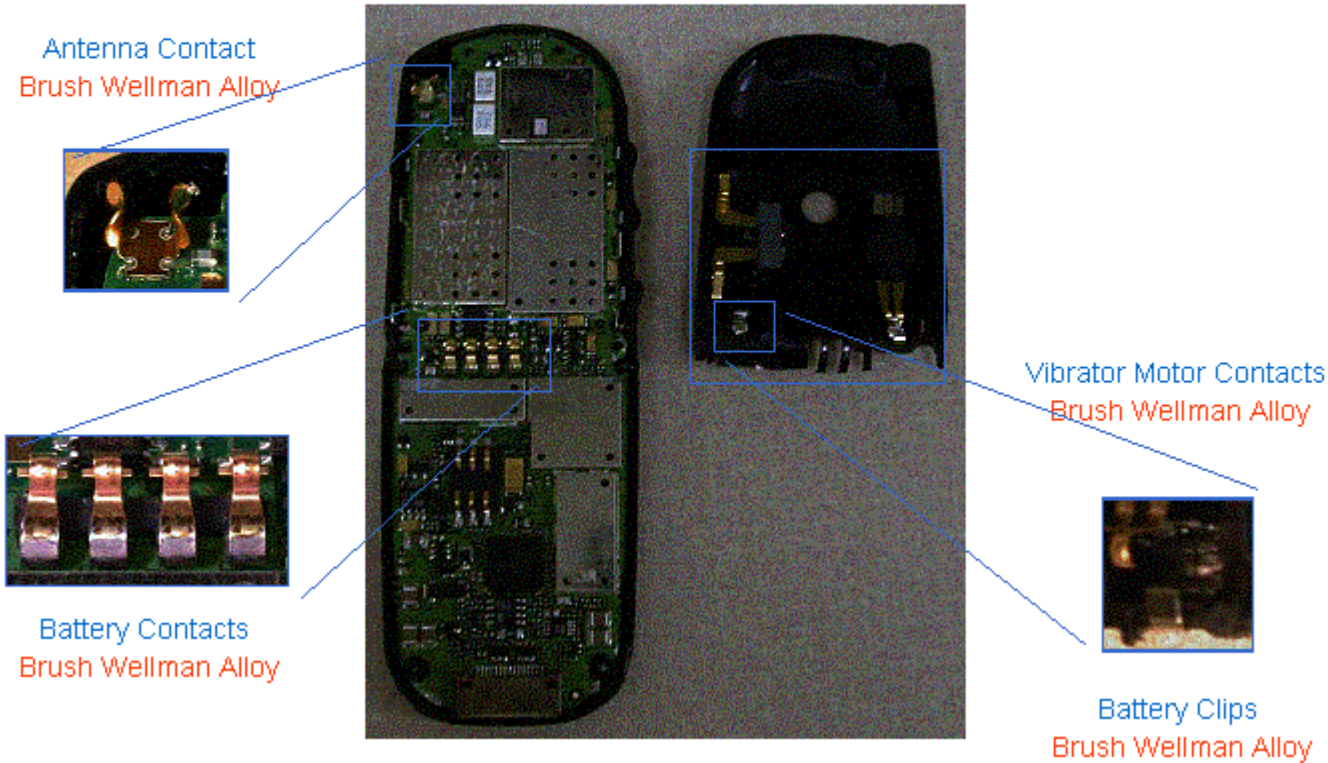
# *Cellphone Connector Applications*

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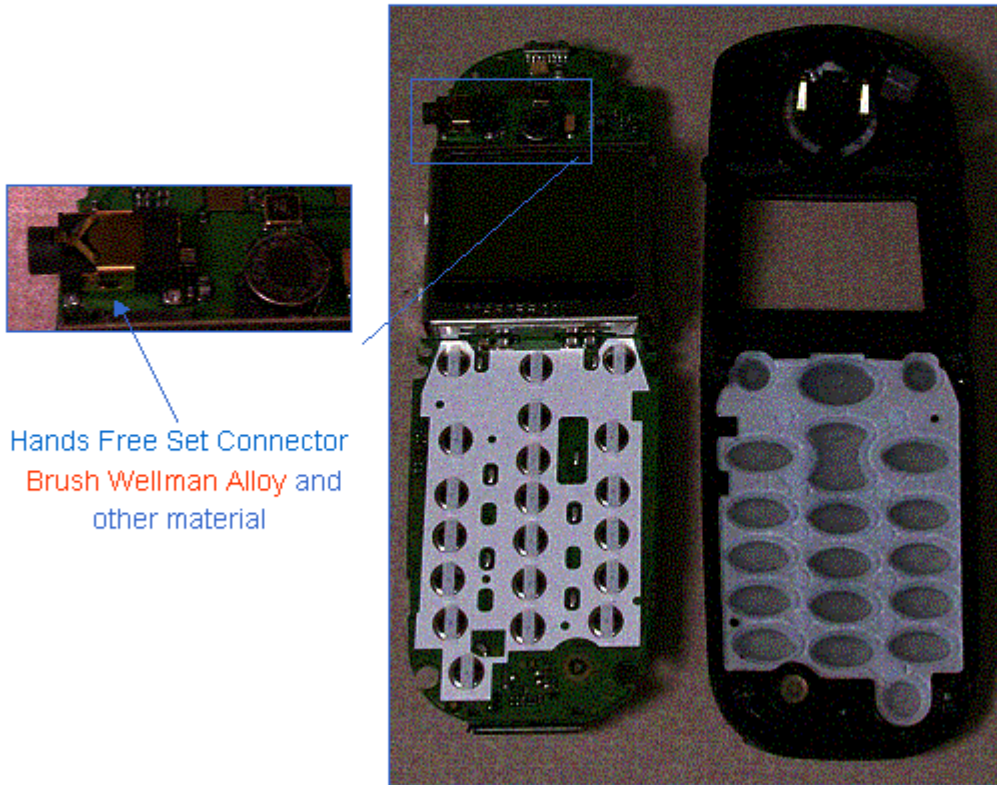


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# Rear of Circuit Board



# *Front of Circuit Board*



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# *Alloy Products*

## *Bulk Products - Product forms & applications*

### ➤ **Product Forms**

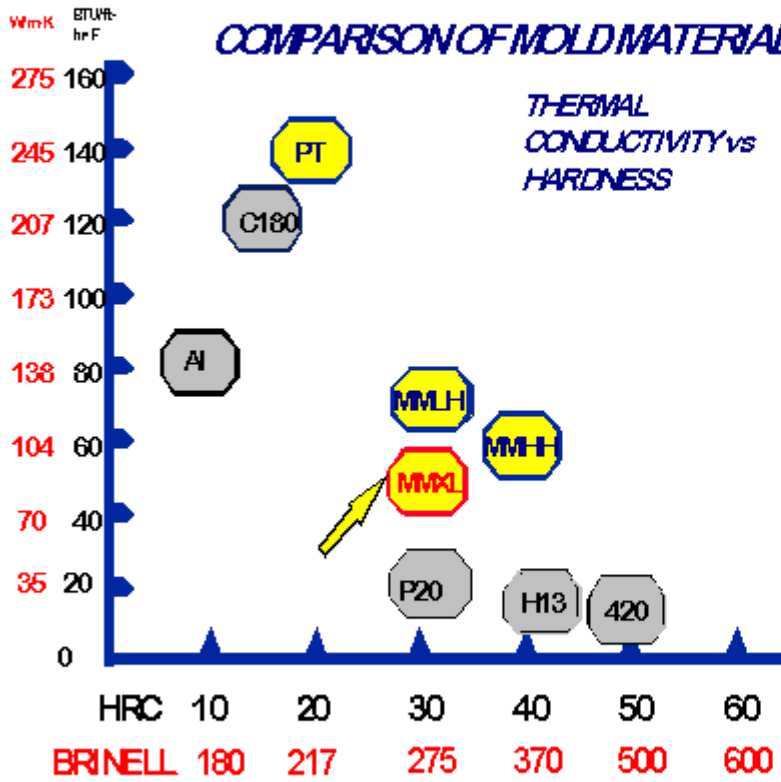
- Any shape other than strip
- Typically supplied as Rod, Bar, Thick or thin walled Tube, Plate, Casting Ingot, Forging Billet - or as a custom fabrication.
- Supplied either as ready to machine and use, or for customer to heat treat after machining to obtain specific properties.

### ➤ **Applications**

- Plate: Plastic molds; Metal casting molds
- Rod/Bar: Aero bearings; Electrical welding electrode holders;  
Mechanical fittings; Plastic mold heat conductors
- Tube: Aero bearings; oil & gas drilling instrumentation casings;
- Casting Ingot: High strength/conductivity foundry castings
- Master Alloy: Aluminum and Magnesium refinery additives

**BRUSHWELLMAN**  
Engineered Materials

# Plastics - Moldmax XL



- Similar properties to dominant tooling materials and standard Moldmax
- Productivity similar to Moldmax (CuBe) of 30%
- No EH&S issues
- Value proposition includes machinability >5X steels adding cost benefits to offset increased material costs

Value proposition - no added cost for faster cycles and lower cost manufacturing

# *Lorain Casting Facility*

## *Spinodal and Equacast<sup>TM</sup> Technology-Winning!*

High performance Copper based engineered materials:

- Strength and hardness found in CuBe products
- Thermal conductivity

The value proposition differentiates:

- No EH&S issues
- Corrosion resistance
- Superb tribological properties (low friction coefficient, excellent wear resistance - without lube) adding value in Reliability, Uptime, and Less Mtce.
- Machinability and Design Simplicity adding cost benefits to offset increased material costs
- Casting capability including size, shapes, tubes and quality

Developing Applications in the markets we are strong:

Mold Tooling, Aircraft Parts, Drilling Equipment

Developing markets/applications where technology is strong:

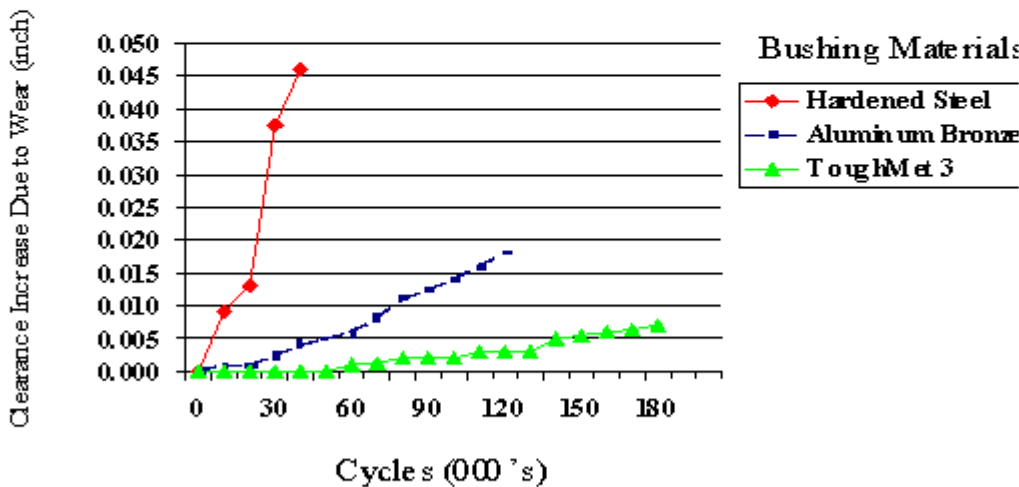
Oil Well Completion Equipment, Mining, Heavy Equipment, Hydraulic Systems, Marine Hardware, Engine Bearings.

Lorain Technology Expanding  
Brush Wellman market and  
application reach

**BRUSHWELLMAN**  
Engineered Materials

# ToughMet™ Industrial Components Results:

**ToughMet™ Alloy Bushings and Plain Bearings Provide Superior Durability**  
Allowing More Time Between Machine Lubrication and Overhaul Operations.

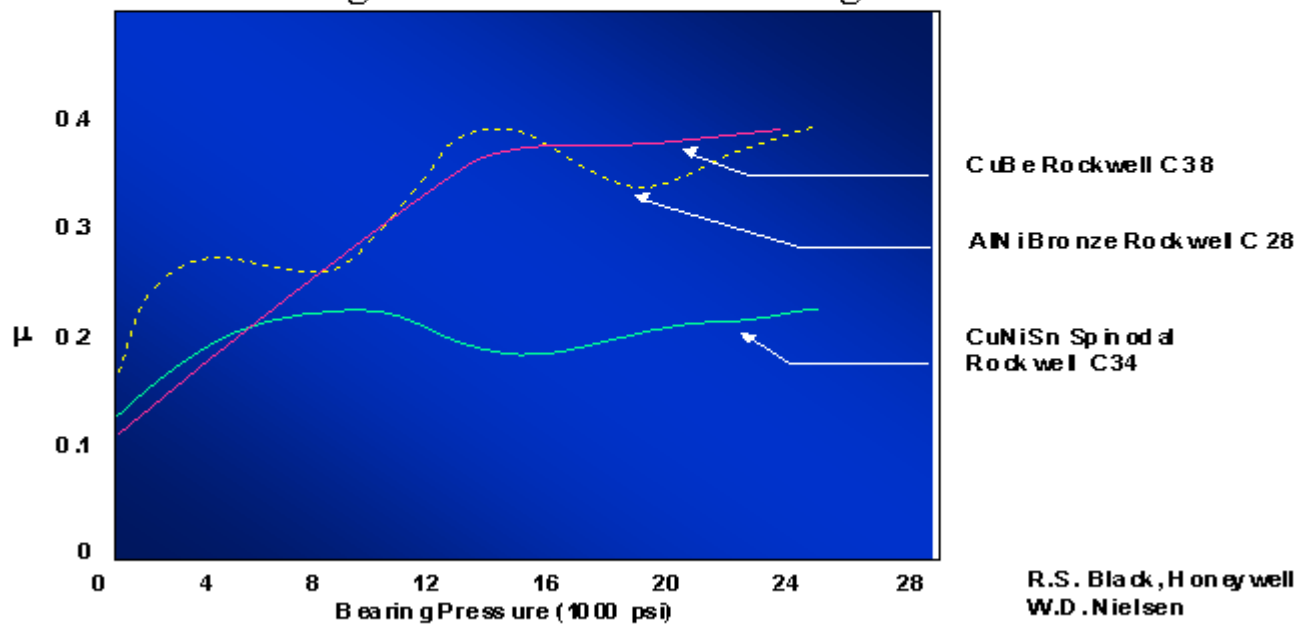


**BRUSHWELLMAN**  
Engineered Materials

# *ToughMet™ Industrial Components Results:*

## **ToughMet™ Alloy Bushings Provide Superior Power Efficiency Performance**

in a Comparison of Dynamic Coefficient of Friction  $\mu$  vs  
Bearing Pressure for Three Bearing Materials



R.S. Black, Honeywell  
W.D. Nielsen  
1996

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Engineered Materials

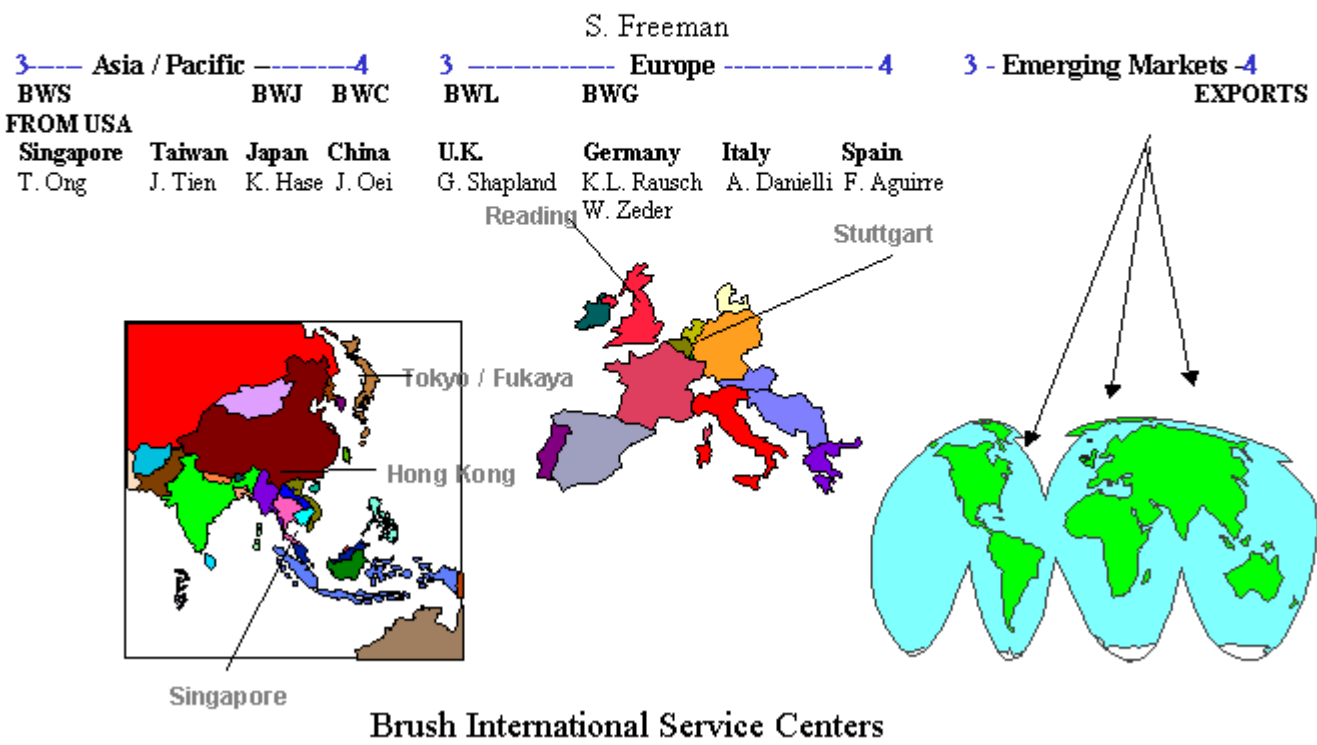
# *Alloy Progress*

- Working Capital
  - Reduced 36% (\$56M) since Q-1 2001
- Expense Control
  - Manpower reduced by 36% since Q-1 2001
  - Manufacturing overhead and SG&A 28% lower in Q-3 2002 vs. Q-1 2001
- Operations
  - Safety (OSHA recordable) rate improved by 33% in manufacturing
  - Rework rate improved 40% YTD
  - On-time shipments to Service Centers 16% higher YTD, along with 14% improvement in manufacturing cycle times

# Brush International Inc.

## Global Sales, Marketing, Distribution & Tech Service

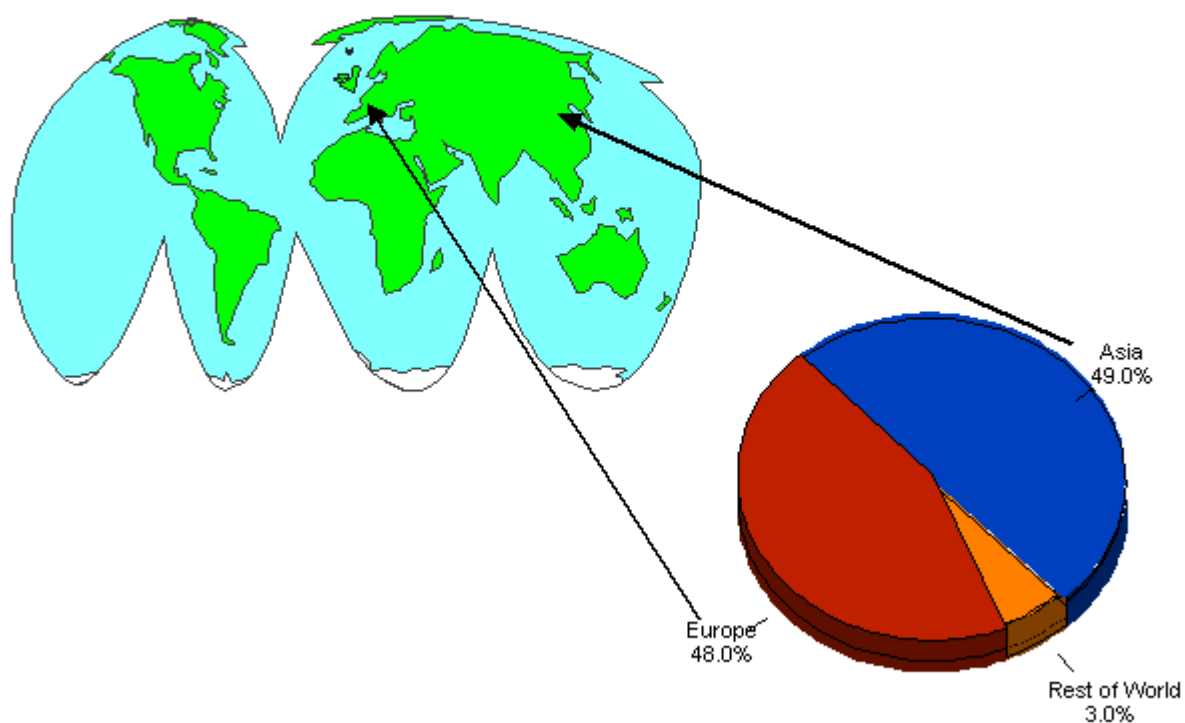
### Brush International Inc.



# *Brush International Inc.*

## *Sales by Region*

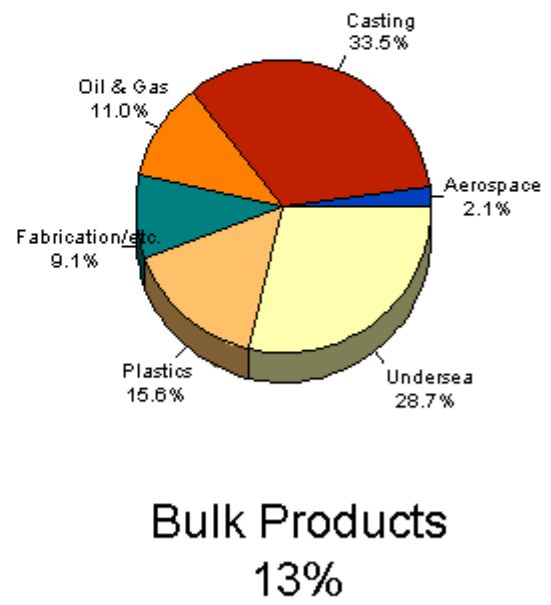
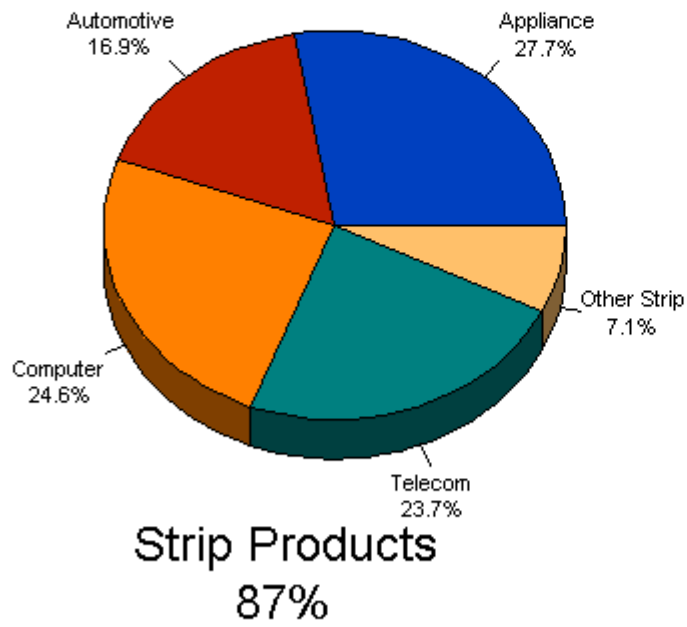
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# *Brush International, Inc.*

## *Sales by Market Segment*

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# *Brush Wellman*

## *Beryllium Products*

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### Products

Beryllium Metal - One of the lightest metals known

- Family of vacuum hot and hot/cold isostatically pressed powder-derived metals

AlBeMet™

- Family of lightweight alloy composites
- Extruded, rolled sheet and hot isostatically pressed powder-derived metals

# *Brush Wellman*

## *Beryllium Products*

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### Products - Cont.

- E-Materials
- Family of low expansion, lightweight electronic packaging materials
  - Composites of beryllium metal and beryllium oxide

### Beryllium Oxide/

- Chemicals
- Ceramic-grade beryllium oxide powder
  - Specialty beryllium-containing chemicals

# *Brush Wellman Beryllium Products*

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## Facilities

Elmore, Ohio

Fremont, California

# *Key Product Attributes*

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- Be/AlBeMet™
  - Light Weight (Density)
  - High Stiffness (Elastic Modulus)
  - High Thermal Conductance/Capacity
  - Low Thermal Expansion
- Be
  - Transparent to X-Rays
  - Neutron Reflector

# *Brush Wellman Beryllium Products*

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## Primary Competition... Alternative Materials

Organic Composites (e.g. Carbon epoxy)

Metal Matrix Composites (e.g. Al - silicon carbide)

Titanium

Aluminum (high strength grades)

# *Major Defense/Aerospace Applications for Brush Wellman Beryllium Products*

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## Optics

Optical substrate and support structure for visual and infrared target acquisition systems (fighter aircraft, helicopters, tanks) and astronomical telescopes.

## Satellites

Structures for defense and commercial telecommunications satellites.

## Electronics

Electronic packaging for defense avionics and electronic countermeasures systems for helicopters and fighter aircraft. Applications include chassis, circuit boards, covers and packages.

**BRUSHWELLMAN**  
Engineered Materials

# *Major Commercial Applications for Brush Wellman Beryllium Products*

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## X-ray Windows

Radiographic tube components for ① medical diagnostic equipment (x-ray, mammography, CAT-scan), and ② industrial x-ray equipment

## Optical Scanners

Mirrors for laser scanners used in reprographic and other high-performance laser applications.

## Motion control

Structural components for high-precision semiconductor processing and industrial robotic equipment

**BRUSHWELLMAN**  
Engineered Materials

# *Beryllium Products - Trends*

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- Good growth in defense sales in 2002. Slowdown noted in commercial business due to weak industrial markets.
- Defense bookings remain strong for delivery early in 2003.
- Defense sales outlook is excellent long term. Examples include production build of F-22, classified satellite, and missile defense system business.

# *TMI - From a Customer Perspective*



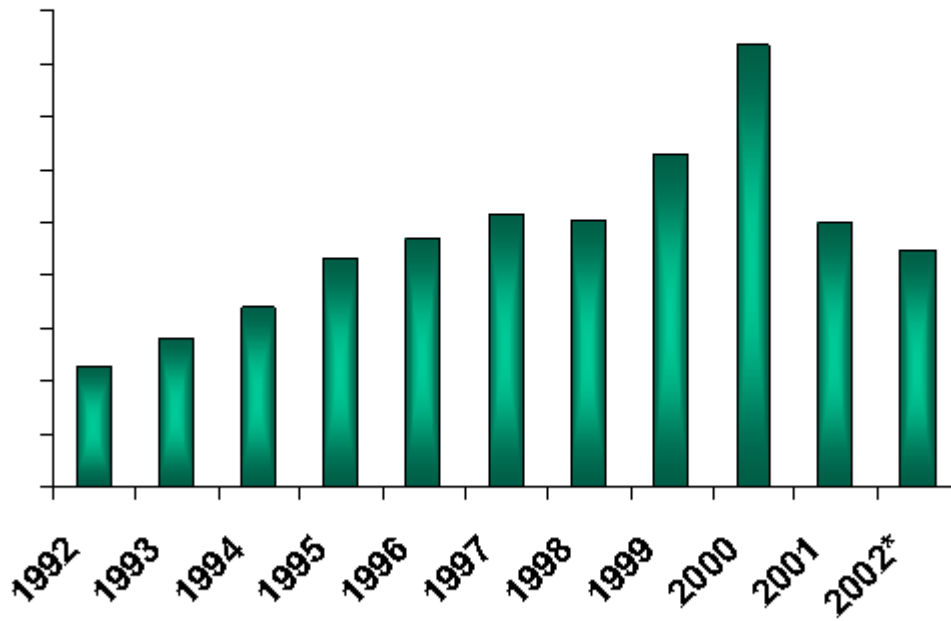
- 
- WHAT TMI provides our customers the ability to demand varied performance (electrical, thermal, or mechanical) from a metal surface area or section.
- WHO We provide this “service” to the telecommunication, automotive, computer, semiconductor and other industries.
- HOW By offering various forms of strip metal products: clad metals, plated metals, electron beam welded, solder plated, reflowed or printed-on, milled and/or skived metal strip or various combinations of the above.

# Sales Growth

*Average annual growth rate was 14% from 1995 - 2001*



Millions

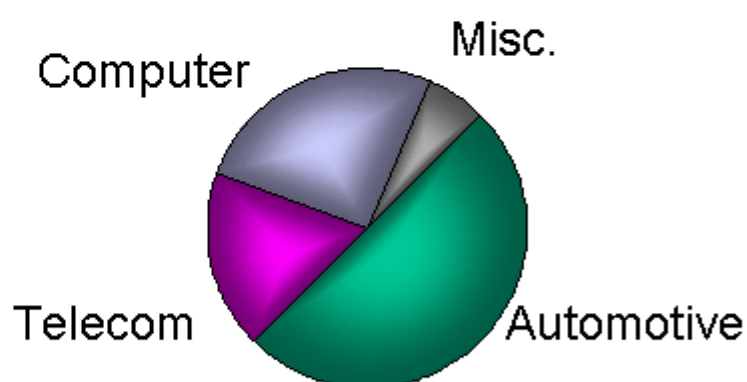


\*Forecasted

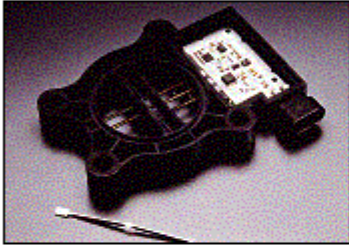
# *Our Major Markets*



- Automotive
- Telecommunications
- Computer
- Jewelry
- Semiconductor
- Appliances
- Medical
- Aircraft



# *Our Major Applications*

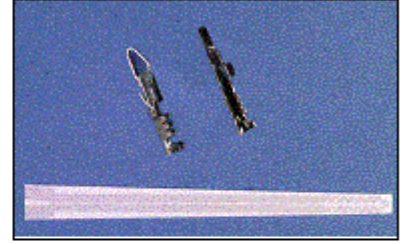


Leadframe



Air Bag Sensor

- Capacitors
- Coins and Tokens
- Connectors
- Contact Probes
- Fuses
- Leadframes
- Micro Motor
- Microwave
- Potentiometers
- Relays
- Sensors
- Solder Clips
- Switches



Connectors



# *Electroplating*



- Precious and non-precious metals
- Overall and selective stripe capabilities
- Combination with current TMI technologies

# *Stripe Plating Application*

## *Cellular Phone Battery Contact*



### **Base Material**

- Base Material: BeCu
- Overall Ni plating
- Selective Au (one side)
- Selective SnPb (both sides)

# *Competitive Advantage*



- Quality
  - QS 9000 / ISO 9002
  - State-of-the-art equipment
  - Vision Systems / PLC Systems for consistent quality
- Design Support
  - Technical knowledge
  - Engineering expertise
- Overall Capabilities
  - Slitting and leveling
  - Inlay / Electron-Beam Welding / Solder / Milling / Skiving / Plating
  - Any combination of the above processes
  - Large coil handling capability

# Strategic Concept



- Total capability under one roof
- Make it easy for our customers to get what they need to satisfy their customers' requirements
- Make our customers competitive with reliable products
- Solve problems for our customers with engineered strip metal solutions
- Explore and develop new markets and geographic regions for manufacturing (*China*).

# *Growth in Electroplating*



- Precious and non-precious metals
- Overall and selective stripe plating capabilities
- Combination with other TMI technologies
- Proprietary closed contact plating technology
- Building additional lines to further increase capacity

# Summary



- From 1992-2000 TMI sales more than quadrupled.
- 2001 and 2002 proved to be extremely difficult years due to major served markets being severely depressed; however, TMI remained profitable in both years.
- We have added major new technical capabilities using state of the art equipment in precious metal electroplating to better serve worldwide customer demand (*both technical & capacity*).
- We are ISO and QS registered.
- We will add additional Plating technology and capacity to service market demand as required.
- We are making further inroads into new markets (*energy*) and other markets (*consumer, medical, appliance, construction*) in order to broaden our served market base and will have a much different served market profile by 2004/2005.

*Our focus is on materials, circuitry,  
subassemblies and packaging for the wireless  
& fiber-optic telecom market,  
specifically the signal amplifiers...*

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- Signal amplifiers transmit signals through air (wireless) or optical fiber media by boosting signal strength while maintaining integrity. Thermal management and reliability properties are of paramount importance.
- Signal amplifiers are critical active components located in base stations for wireless (cellular) and in regenerator stations along fiber-optic (Internet) links.



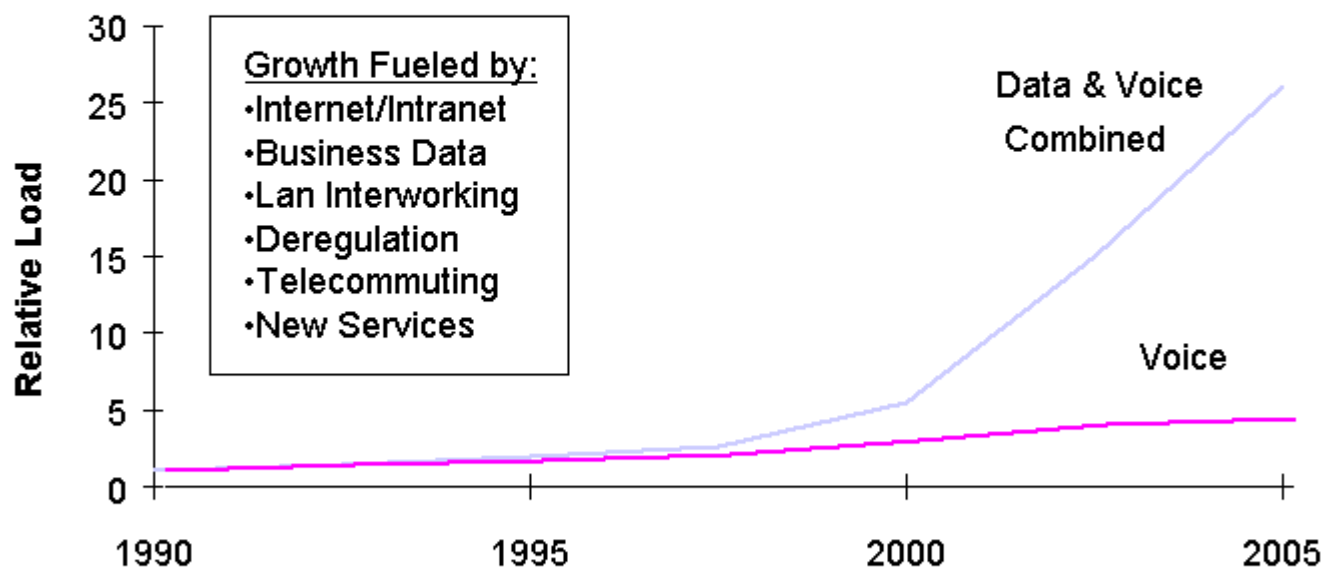
# *Our Overall Strategy*

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- Vertically integrate materials to subsystem assembly, providing customized solutions
- Meet the Customer's needs
  - Materials or subassemblies
- Fast Flexible Manufacturing Systems
  - Responsive to market needs



*Data is demanding and will play an expanding role  
in the communication infrastructure*



ElectroniCast, CIBC Oppenheimer

**Zentrix**  
TECHNOLOGIES  
Integrated Resources. Targeted Solutions.

# *Business Groups*

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- **Packaging**
  - Electronic Packaging Products
- **Circuitry**
  - Circuits Processing Technology
- **Materials**
  - Powder Metal Products
  - Brush Ceramic Products\*

\*As part of our Materials group, Zentrix provides sales and marketing support of beryllium oxide (BeO) ceramics for the industry leader, Brush Ceramic Products, Inc.



# *Electronic Packaging Products*

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- Located in Newburyport, MA
- Products
  - RF Power Packages for base stations in cellular phone & wireless data networks, cellular phones and smart antennas
  - Fiber Optic Package components for amplifiers in fiber optic networks (to carry internet traffic)
  - Automotive Components for ignition systems in cars and trucks



# *Circuits Processing Technology (CPT)*

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- Located in Oceanside, CA
- Products
  - High Frequency Wireless circuitry for base stations in cellular phone & wireless data networks and satellite communications
  - Fiber Optic Package components for amplifiers in fiber optic networks (to carry internet traffic)
  - High Frequency Military and Aerospace Circuitry used in military radar and missile guidance



# *Powder Metal Products*

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- Located in Tucson, AZ
- Products
  - RF Power Package Components for base stations in cellular phone and wireless data networks
  - Fiber Optic Package Components for amplifiers in fiber optic networks (to carry internet traffic) and commercial lasers such as high speed printers



# *Brush Ceramic Products\**

*Marketed and distributed by Zentrix Technologies*

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- Located in Tucson, AZ
- Products
  - RF Power Package Components for cellular base stations, high definition television (HDTV), and cable TV
  - Fiber Optic Package components for amplifiers in fiber optic networks (to carry internet traffic)
  - Gas Laser Components for DNA analysis, cataract removal, HIV and other blood related testing, silicon wafer defect detection, teeth whitening, R&D materials research
  - Automotive components for ignition systems

\*Sales and marketing support of Brush Ceramic Products is provided by Zentrix Technologies



# *Williams Advanced Materials Overview*

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- Williams is a supplier of high-purity, specialty metals serving the wireless, photonics, data storage, high temperature joining, traditional microelectronics and performance film markets.
- Established 1918. Subsidiary of Brush Engineered Materials (formerly Brush Wellman Inc.)
- Business Groups
  - Packaging Material Products - Solder preforms, bonding wire, FLA's, clad material and refining. These materials are used in photonic, wireless, traditional semiconductor and hybrid microelectronic packaging applications.
  - Specialty Alloy Products - Braze materials and structural alloys. These materials are used in electron tube, photonic and aerospace applications.
  - PVD(Physical Vapor Deposition) products - Precious metal and non-precious metal sputtering and evaporation materials, refining and related services. These materials are used in wireless, photonic, thin film heads, optical media, hybrid microelectronic and performance film applications.



# *WAM Headquarters*



- Buffalo, NY USA - Manufacturing Facility
  - 100,000 ft<sup>2</sup> overall, 6,500 ft<sup>2</sup> of cleanroom, state-of-the-art machining/ milling/rolling/stamping/ cladding centers, hydrostatic wire extrusion, high purity refining/recycling, metals casting, automated plating, full analytical capabilities, product Research & Development



# *Far East Operations*

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- **Singapore - WAM Far East Pte. Ltd.**
  - 5,000 ft<sup>2</sup>, 2,500 ft<sup>2</sup> of cleanroom, automated assembly operations, hydrostatic wire process, product development. PVD bonding operation.



# *Far East Operations*

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- Subic Bay, Philippines
  - Combo-Lid®, low-cost lids and preform - assembly, inspection and packaging



# *Specialty Alloys Operations*

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- Wheatfield, NY USA- Williams Specialty Alloys
  - 30,000 ft<sup>2</sup> with volume vacuum casting, rolling, annealing, powder atomizing and machining. 10 acres for expansion



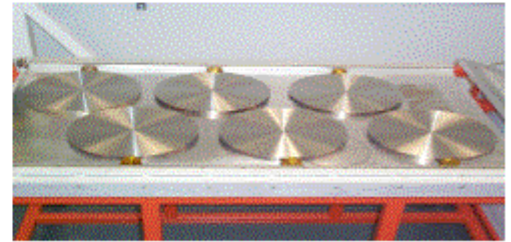
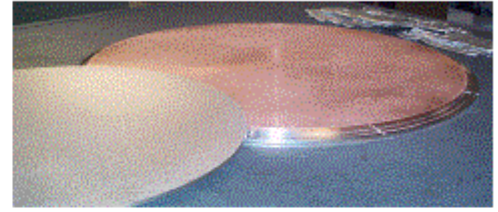
# *Pure Tech Operations*



- Brewster, NY USA - Pure Tech
  - 35,000 ft<sup>2</sup> with vacuum melting, hot-pressing, milling, Hot & cold rolling automated machining and target bonding capabilities.
  - Acreage to more than double our facility as needed.

# *Target Bonding Centers*

- Buffalo, NY
- Brewster, NY
- Santa Clara, CA
- Limerick, Ireland
- Singapore
- Taiwan – Q4



# ***Williams Advanced Materials***

## ***Service and Support***

### ➤ **Regional Offices (Sales and Applications Engineering support)**

Santa Clara, CA	Manila, Philippines
London, England	Buffalo, NY
Singapore	Boston, MA
Guadalajara, Mexico	Dallas, TX
Brewster, NY	Tucson, AZ
Taipei, Taiwan	

### ➤ **Worldwide Representatives**

Florida	France	Israel
Korea	India	China
Japan	Italy	Germany



# *Williams Advanced Materials Packaging Material Products*



Hybrid Microelectronic Device



Solder preforms and clad materials

## › **Markets**

Wireless, Photonics and Hybrid/  
Traditional Microelectronic Devices

## › **Typical End-uses**

Cell phones, LEDs, fiber-optic  
networks, PC's, military  
electronics, avionics, medical  
electronics, appliances

## › **Combo-Lids® - Frame/lid assembly**

Hermetic sealing

## › **Clad Materials**

Thermal management

## › **Bonding Wire**

Electronic interconnect

## › **Solder Preforms**

Component attachment

## › **Refining**

Scrap recovery



# *Williams Advanced Materials Specialty Alloy Products*

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Electron Tube



WAMBRAZE™ Materials

## ➤ **Markets**

Electron Tube, Photonics, Aerospace,  
microelectronic packaging

## ➤ **Typical End-uses**

Cellular base stations, lasers, x-ray  
machines, industrial microwaves

## ➤ **Braze materials**

Powder, ribbon and preform

## ➤ **Structural Alloys**

Monel

Cupronickel

Nickel Tungsten



# *Williams Advanced Materials*

## *Physical Vapor Deposition(PVD) Products*

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**Markets**

Cellular Phone (wireless)



**Products**

Sputtering Targets

### › **Markets**

Wireless microelectronics, Optical media, Photonics, thin film heads, glass, decorative, wear resistance, performance film

### › **Typical End-uses**

Wireless and fiber optic components, Recordable CDs, DVDs, Architectural glass, Hard Disks, faucets, automotive glass

### › **Precious Metal Sputtering Targets and Evaporation Materials**

### › **Precious Metal Refining Services**

### › **Non-precious Metal Sputtering Targets and Evaporation Materials**



# *Williams Strategic Leverage*

*Ensuring Distinctive Abilities Translate to Maximum Returns*

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- Over 80 years of metal management and fabrication experience
  - Ability to efficiently manage precious metals critical to customers
- One-stop Shopping
  - Comprehensive product offering
  - Allows customer to reduce supplier base
- Industry leading lead times
  - Reduces Total Cost to Customer - Inventory turns
  - Alleviates planning “headaches”
- Fully Integrated Operations
  - In house fabrication, refining and analysis
  - Reduced cycle times and single point of contact for metal needs
- Service
  - WAM provides a unique, coordinated response to customers
  - We help our customers do their jobs - sales, engineering, accounting, etc.
  - We also prepare our customers for the future



# *WAM - Trends*

- Wireless and Photonics
  - Market flat to down through 2002
  - WAM well positioned with major device manufacturers
  - Expected gains in market share and new customers
- Data Storage
  - 15-20% growth in DVD market segment through 2002
  - Flat MR/GMR market segment
- Traditional Microelectronics
  - Strong growth anticipated in military component
  - Commercial business flat through 2002
- High Temperature Joining
  - Tied to telecom infrastructure. Softness through 2002 expected.

# *Litigation*

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- Positive Momentum Continued Through 2002

## *Highlights:*

- Consecutive series of favorable court rulings throughout 2002 builds on 2001 legal successes
- Favorable court rulings and settlement agreement allowed Brush Wellman to reduce caseload by half

# *Litigation*

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- In the Court Room:
  - Judges and juries have continued to decide for Brush Wellman in a number of important cases in several states. Resulting benefits:
    - + Exonerates Brush Wellman from baseless charges
    - + Formally acknowledges Brush Wellman's extensive worker protection measures

# *Litigation*

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- *Summary of Workplace-related Litigation*  
*Decided in Favor of Brush Wellman in 2002:*

# *Consecutive Legal Victories*

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- Colyer v. Brush Wellman. (Orange County, California Superior Court) November 2002.
  - 12 person jury returned a unanimous verdict for Brush Wellman following a five-week trial finding that:
    - The company was not negligent
    - There was no defect in the product or warnings
    - Brush Wellman did not conceal or suppress any material fact

# *Consecutive Legal Victories*

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- Renwand v. Brush Wellman Inc. (Court of Appeals, Eighth District, Ohio). October 2002.
  - Unanimous ruling by three-judge panel affirmed earlier summary judgment for the company by the Cuyahoga County, Ohio trial court
  - In its ruling, the court recognized Brush Wellman's safety precautions and noted, based on the evidence provided, the company "did not disregard the safety of its employees and worked diligently to protect its employees from CBD (chronic beryllium disease)."
  - Ruling discredits false and sensationalized charges by certain media, and plaintiffs' attorneys who alleged Brush Wellman compromised worker protection

# *Consecutive Legal Victories*

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- David Norgard v. Brush Wellman Inc. (October 2002)
  - Court of Common Pleas, Cuyahoga County, Ohio granted Brush Wellman's motion for summary judgment
    - Ruling further discredits inaccurate and unsupportable charges made by plaintiffs and their trial attorneys alleging wrongful acts by Brush Wellman involving its employees, or involving the company's extensive and proactive occupational health and safety initiatives.

## *Caseload Significantly Reduced in 2002*

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- As of Nov. 30, 2002, caseload reduced to 41 cases.
- Settlement reached in second quarter 2002 included dismissal of claims by 87 plaintiffs
  - Settlement did not materially affect Brush Engineered Materials Inc.' financial results
    - Portion of the settlement expense is covered by insurance, with the remainder adequately provided for in earlier established reserve
    - Provided company with expedient and cost effective way to place a large block of claims behind it
    - Further reduces future risk and uncertainty associated with this litigation